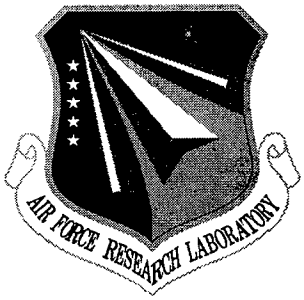
AFRL-IF-RS-TR-2001-76 Vol II (of four)
Final Technical Report
May 2001



EXPLORING A THEORY DESCRIBING THE PHYSICS OF INFORMATION SYSTEMS, INFORMATION PHYSICS BIBLIOGRAPHY

Zetetix

Sponsored by
Defense Advanced Research Projects Agency
DARPA Order No. K177

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AFRL-IF-RS-TR-2001-76 Vol. II (of four) has been reviewed and is approved for publication.

APPROVED: Deborah A. Cerino

DEBORAH A. CERINO
Project Engineer

FOR THE DIRECTOR: James A. Collins

JAMES A. COLLINS, Acting Chief
Information Technology Division
Information Directorate

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EXPLORING A THEORY DESCRIBING THE PHYSICS OF INFORMATION SYSTEMS, INFORMATION PHYSICS BIBLIOGRAPHY

Scott Young Harmon

Contractor: Zetetix
Contract Number: F30602-00-C-0104
Effective Date of Contract: 06 April 2000
Contract Expiration Date: 05 October 2000
Short Title of Work: Exploring a Theory Describing the Physics of Information Systems, Information Physics Bibliography
Period of Work Covered: Apr 00 - Oct 00

Principal Investigator: Scott Young Harmon
Phone: (818) 991-0480
AFRL Project Engineer: Deborah A. Cerino
Phone: (315) 330-1445

This research was supported by the Defense Advanced Research Projects Agency of the Department of Defense and was monitored by Deborah A. Cerino, AFRL/IFTD, 525 Brooks Road, Rome, NY.

REPORT DOCUMENTATION PAGE	Form Approved OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	MAY 2001	Final Apr 00 - Oct 00

4. TITLE AND SUBTITLE
EXPLORING A THEORY DESCRIBING THE PHYSICS OF INFORMATION SYSTEMS, INFORMATION PHYSICS BIBLIOGRAPHY

5. FUNDING NUMBERS
C - F30602-00-C-0104
PE - 63760E
PR - IAST
TA - 00
WU - P1

6. AUTHOR(S)
Scott Young Harmon

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Zetetix
PO Box 2640
Agoura CA 91376-2640

8. PERFORMING ORGANIZATION REPORT NUMBER
N/A

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Defense Advanced Research Projects Agency
3701 North Fairfax Drive
Arlington VA 22203-1719

Air Force Research Laboratory/IFTD
525 Brooks Road
Rome New York 13441-4505

10. SPONSORING/MONITORING AGENCY REPORT NUMBER
AFRL-IF-RS-TR-2001-76
Vol II (of four)

11. SUPPLEMENTARY NOTES
Air Force Research Laboratory Project Engineer: Deborah A. Cerino/IFTD/(315) 330-1445

12a. DISTRIBUTION AVAILABILITY STATEMENT
APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED.

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

This project accomplished all of its objectives: document a theory of information physics, conduct a workshop on planning experiments to test this theory, and design experiments that validate this theory. Information physics proposes quantitative relationships between observable information flows and changes in the content information systems maintain. This theory explains all flows within information systems as either diffusive or force-driven. The forces driving information flows arise from the existence of goal content. The workshop participants discussed various theories and considered experiments that characterize the macroscopic phenomena underlying complex information system behavior. These participants identified experimental opportunities that exploit existing databases, execute simulations and conduct traditional controlled experiments. They recommended that focussed experiments to test theories explaining information system phenomena were feasible today. The experiment plan builds upon the workshop's result and proposes experiments that measure information device energy dissipation, test the independence of symbol execution work from device efficiency, measure information diffusion rates in information systems, and measure force-driven information flows. These experiments are both technically and programmatically feasible. When validated, the proposed theory can guide designers to reliably build more effective, secure and predictable information systems.

14. SUBJECT TERMS	15. NUMBER OF PAGES
Information Physics, Physics of Computation, Information Theory, Thermodynamics	60
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UL

The bibliography presented below was collected to explore the prior work related to information physics. This bibliography includes references from the fields of complexity theory, the theory of computation, computational complexity, the physics of computation, thermodynamics, information theory, reversible computation, and quantum computation among others. Regrettably, the coverage of these fields is largely incomplete, especially in the areas of complexity theory, information theory and quantum computation, all of which contain vast bodies of knowledge in themselves. However, the purpose of this bibliography was not to provide complete coverage of all possible sources of information but more to collect possible pointers into the fields that contain knowledge relevant to information physics. Particular effort was spent in collecting the references related to the physics of computation so any bias resides in that direction.

As with all bibliographies of dynamic fields of study, this one represents a snapshot of the field as of October 2000. Many of the entries contained herein are incomplete, some more than others. The contents of this bibliography reside in a bibliographic database and will be updated as periodically as possible. The author invites comments, corrections and additions to this bibliography and may be contacted through the information presented on the cover page.

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*U.S. GOVERNMENT PRINTING OFFICE: 2001-610-055-10090

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